Colonial Waterbird Analysis in the San Francisco Bay Area (1980-2016)

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INTRODUCTION

The Colonial Waterbird Program at San Francisco Bay Bird Observatory (SFBBO), directed by Dr. Max Tarjan, has monitored herons, egrets, terns, and other colonial waterbirds for the last 37 years throughout the Bay Area. However, this data isn't in a format that can be used for trend analysis. It is important to make use of this extensive amount of data because very little published research exists on trends within bird colonies. This information can indicate the health of the surrounding environment and be utilized by policy makers and land management companies. Therefore, this study is important to the conservation efforts of SFBBO and to better guide land management decisions in the San Francisco Bay Area.

RESEARCH QUESTIONS

1) Within different species, are breeding adults increasing or decreasing over time?
2) Are birds nesting earlier or later in the year as time goes on?
3) Are birds nesting more or less within their specific colony site over the years?
4) Are these trends dependent or influenced by colony site location?

PROJECT GOALS

1) Organize several thousand observations into workable spreadsheets for GIS and SPSS analysis
2) Create a geodatabase with both raw and analysis data
3) Analyze datasets for significant nest size and nesting date trends in bird colonies and species
4) Create a Storymap for the SFBBO website
5) Give SFBBO final spreadsheets and instructions on how to continue to add data and conduct analyses

METHODS

SFBBO supplied 37 years of extensive waterbird colony data collected by volunteers. With the data provided, our group created a comprehensive spreadsheet based on peak nest number and peak nest date.

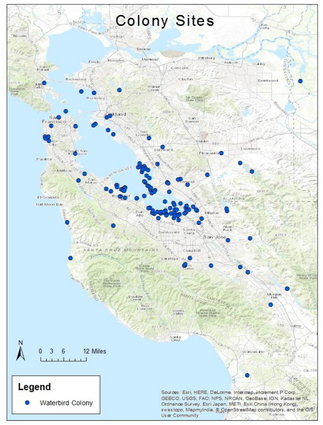
Peak Nest Number: The largest number of nests observed in a year for a given colony site.
Peak Nest Date: The date in which the greatest amount of nests was observed in a year for a given colony site.

Peak nest number was illustrated and analyzed on ArcGIS 10.3 while peak nest date was examined on IBM SPSS 23.

ACKNOWLEDGMENTS

Many thanks to the San Francisco Bay Bird Observatory, Dr. Max Tarjan, and Professor Jonathan LaRiviere

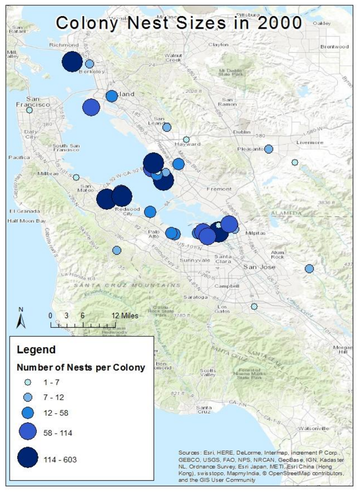
STUDY AREA



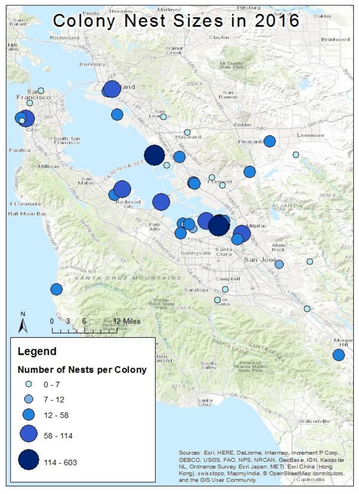
Map 1. Locations of all SFBBO monitored colonies.

American Avocet
The Robinson Library

FINDINGS



Map 2. Nest number for various colonies in 2000 using graduated symbols



Map 3. Nest number for various colonies in 2016 using graduated symbols.

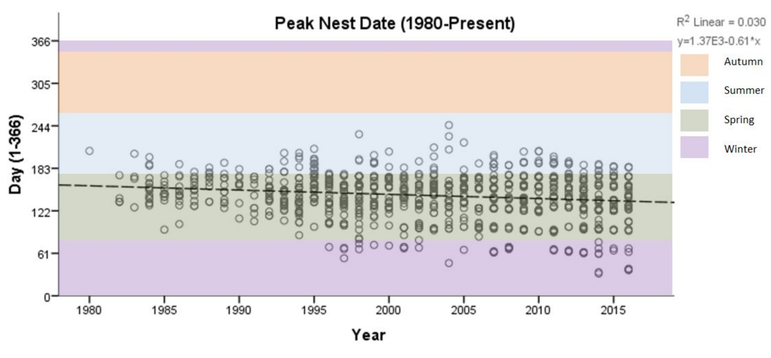


Fig 1. Changes in peak nest date of waterbird colonies. (n=1136 data points, includes all species. Purple represents Winter, green Spring, blue Summer, and orange Autumn).

FINDINGS CONT.

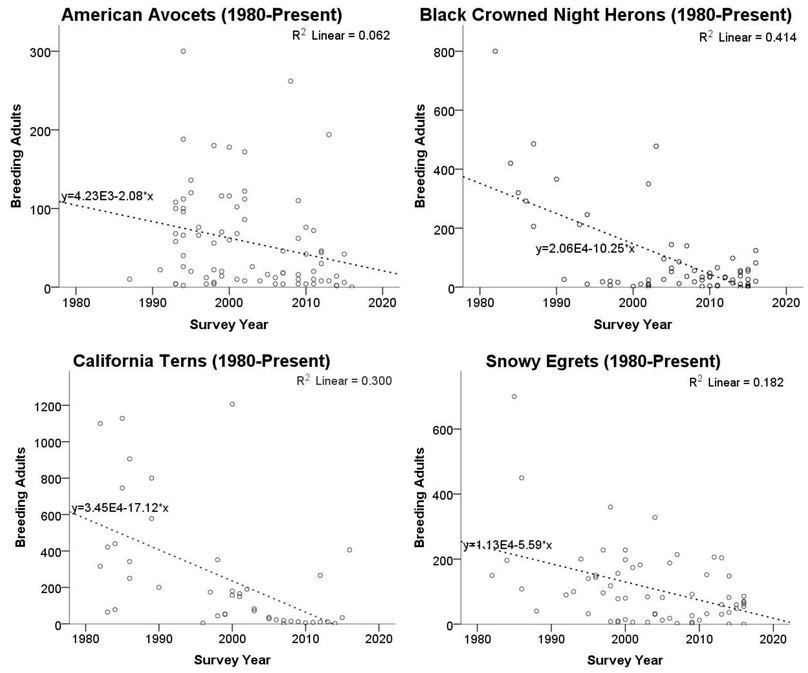


Fig 2. Trends in number of breeding adults by species.

CONCLUSIONS

- Peak nest date, across all colonies and species, has been occurring earlier each year since 1980.
- Breeding adults of four species have been decreasing in number since 1980 (American avocet, black-crowned night heron, California tern, and snowy egrets).
- From 2000 to 2016, the number of colony sites increased and expanded across the Bay Area.
- However, there is a general decrease in colony nest sizes from 2000 to 2016.

Note: *These results are produced in the context of SFBBO's citizen science data collection*

FUTURE RECOMMENDATIONS

- Consistent and standardized data collection across colony sites
- Analyze colony sites over time
- Explore external factors, such as climate change, that contribute to results found

REFERENCES

Colonial Waterbird Program 2017 Monitoring Manual (n.d.): n. pag. San Francisco Bay Bird Observatory. Web.
Dunn, P. O., & Winkler, D. W. (2010). Effects of climate change on timing of breeding and reproductive success in birds. *Effects of climate change on birds*, *11*.
San Francisco Bay Bird Observatory. (n.d.). Retrieved March 12, 2017, from http://www.sfbbo.org/

Pitch

Our group has been working with 37 years of waterbird data collected by the San Francisco Bay Bird Observatory, also known as SFBBO. SFBBO is a nonprofit organization dedicated to the conservation of birds and their habitats through science and outreach.

The data given to us were observations made by citizen science volunteers. We organized several thousand observations into workable spreadsheets for GIS and SPSS analysis and created a geodatabase for both raw and analysis data.

Using GIS and SPSS, we were able to analyze and find trends within the data they supplied. We found that colonial waterbirds in SF Bay Area have gradually been nesting earlier in the year since 1980. The number of nests across all colony sites have been, for the most part, declining since 1980 as well.

We will be giving SFBBO a storymap of the data trends to display on their website to show their volunteers. This will encourage citizen science volunteers to continue to collect data and give them the opportunity to explore and learn from the data. We will also give SFBBO spreadsheets and a geodatabase to continue to collect data, analyze it, and display it in the future.

Our results aim to better SFBBO’s data collection, conservation efforts, and influence land management decisions.

Missing: gravity of work - several thousands of observations - hasn't been in a format to view the temporal/trend characteristics

- Add goals section
  - Created a new format
  - Gave infrastructure to SFBBO
  - Did analysis
  - Gave them new format
    - (Should be in pitch as well!)

Less text in Intro

However = this data isn't currently available in a form to optimize for full analysis

- No .612 - have to consider r squared; no magnitude (number) in poster.
- decline in number of nests
- put dates in title; make title sans serif